REMARKS

This is intended as a full and complete response to the Office Action dated August 28, 2002, having a shortened statutory period for response set to expire on November 28, 2002. Please enter the following amendments and reconsider the claims pending in the application for reasons discussed below.

The drawings have been amended to include omitted reference numbers and typographical errors noted subsequent to filing the application. A drawing amendment is submitted herewith. It is believed that the amendment is supported by the specification and the drawings without adding new matter, and should be entered.

Claims 1-88 are pending in the application. Applicant confirms the election of Group I, claims 1-29. Claims 30-88 are withdrawn from consideration as being drawn to a non-elected invention. Applicant reserves the right to pursue the subject matter of claims 30-88 in a divisional application at a later date.

Applicants have amended claims 1, 14-16, 19, and 26-27 to correct typographical errors and to include the words, "vertically and laterally movable", as taught at least at page 10, lines 16-26 of the specification, "to hold the substrate", as taught at least at page 10, lines 22-26 of the specification, and "wherein the processing apparatus further comprises". Applicants present new claims 89-155 for consideration by the Examiner. It is believed that no new matter has been introduced in these claims. It should be noted that the claim amendments merely restate elements already present in the claims and/or make explicit what was inherent. Since no narrowing amendments are made, Applicants assert it is entitled to the full scope of equivalents. Accordingly, allowance of the pending claims is respectfully requested.

Claims 1-3, 9, and 14 stand rejected under 35 U.S.C. 102(e) as being anticipated by *Schwartz et al.* (US patent No. 6,080,288). The examiner states that *Schwartz et al.* teaches a system 10 which includes cell 12 and a toroidally-shaped manifold 14 having two inlets 18 and 20, coupled to a supply conduit 21, and an outlet 16. The examiner also states that *Schwartz et al.* also teaches a diffuser 30, having a plurality of openings 33 and positioned downstream of the outlets 16, an anode basket 40 positioned downstream from the diffuser, a cathode assembly having a removable cassette 67 to

hold a glass master 70, two electrical contacts 75 and 76 disposed about the perimeter of substrate receiving surface, a planarizer 50 having a rotatable plate 52 made from plastic, non-conductive material, with a main opening 54 and a plurality of apertures 56 extending radially from the main opening 54, and a pipe or conduit 58 (shaft) coupled to the main openings 54 and extending out of the cell 12.

Applicants have amended claim 1 to change the words "movably disposed" into "vertically and laterally movable", restating elements already present in the claims, and to include the words "to hold the substrate", making explicit what was inherent. Applicants respectfully traverse this rejection on grounds that *Schwartz et al.* discloses a system having a rotable plate 52 above an anode basket 40 to direct the flow of electrolyte in multiple streams; however, the cell 12 is not rotating. Thus, *Schwartz et al.* does not teach, show, or suggest a shaft adapted to rotate the partial enclosure. In addition, *Schwartz et al.* does not teach, show, or suggest a substrate carrier vertically and laterally movable above the permeable disc. Therefore, *Schwartz et al.* does not teach, show, or suggest the apparatus as recited in amended claim 1 and claims dependent therefrom. Claims 1-3, 9, and 14 as amended now are in condition for allowance. Withdrawal of the rejection is respectfully requested.

Claims 1, 5, 9, 10, 12 and 13 stand rejected under 35 U.S.C. 102(b) as being anticipated by *Pearson et al.* (US patent No. 3,763,027). The examiner states that *Pearson et al.* teaches a sparger 12, two anodes 32 and 33, for applying electric power from power source 54, and four plates 23-26. The examiner also states that *Pearson et al.* teaches a trough 17 and two supports 21 and 22, which are constructed from materials chemically inert in the electrolyte, and the sparger 12 and the plates 23 through 26 are also made from inert non-conducting material.

Applicants have amended claim 1 as discussed above. Applicants respectfully traverse this rejection on grounds that *Pearson et al.* discloses an apparatus including a tank 13 and a sparger 12, having four plates 23-26 as part of the sparger 12. Thus, the plates 23-26 are not positioned below the sparger 12. Thus, *Pearson et al.* does not teach, show, or suggest a diffuser plate positioned below the permeable disc. In addition, there is no shaft connected to the tank 13 and adapted to rotate the tank 13. Thus, *Pearson et al.* does not teach, show, or suggest a shaft adapted to rotate the

partial enclosure. Furthermore, *Pearson et al.* does not teach, show, or suggest a substrate carrier vertically and laterally movable above the permeable disc. Therefore, claims 1, 5, 9, 10, 12 and 13, as amended, are now in condition for allowance. Withdrawal of the rejection is respectfully requested.

Claims 4, 5, 7, and 8 stand rejected under 35 U.S.C. 103(a) as being obvious over *Schwartz et al.* or *Pearson et al.* in view of *Uzoh et al.* (US patent No. 6,261,426). The examiner states that *Schwartz et al.* and *Pearson et al.* both fail to teach the material of construction of the diffuser plate and an anode below the diffuser plate, and *Uzoh et al.* teaches an apparatus in Figure 1 having a cylindrical container or cup 14, an inlet 12 through which electrolyte 6 enters cup 14 and flows upwardly toward substrate 12 to constantly replenish electrolyte bath 6a, a baffle 8, and shield 10. The examiner also states that *Uzoh et al.* teaches the materials of baffle 8, and shield 10, comprised of a non-conductive material, such as Teflon, PVDF, or polyvinylchloride, which will not affect the electrical properties of the plate and thus not affect the flow of materials through the plate.

Applicants have amended claim 1 as discussed above. Applicants respectfully traverse this rejection. *Schwartz et al.* and *Pearson et al.* are discussed above. Both fail to teach, show, or suggest a shaft adapted to rotate the partial enclosure, a substrate carrier vertically and laterally movable above the permeable disc, and/or a diffuser plate positioned below the permeable disc as recited in claim 1 and cannot be served to combine with reference as basis for rejection for claims 4, 5, 7, and 8, which are dependent from claim 1.

In addition, *Uzoh et al.*, discloses an electroplating apparatus having a baffle 8 and a shield 10 composed of a non-conductive material. *Uzoh et al.* does not teach, show, or suggest a shaft adapted to rotate the partial enclosure, a substrate carrier vertically and laterally movable above the permeable disc, and a permeable disc positioned in the partial enclosure as recited in amended claim 1 and claims dependent therefrom. Thus, *Schwartz et al.*, *Pearson et al.* and *Uzoh et al.*, individually or in combination, do not teach, show, or suggest the apparatus as recited in amended claim 1 and claims dependent therefrom. Therefore, claims 4, 5, 7, and 8, dependent from claim 1, as

amended, are now in condition for allowance. Withdrawal of the rejection is respectfully requested.

Claims 15-17, 22, 26, 28 and 29 stand rejected under 35 U.S.C. 103(a) as being obvious over *Schwartz et al.* in view of *Cheung et al.* (US patent No. 6,258,223). The Examiner states that *Schwartz et al.* fails to teach multiple processing stations and *Cheung et al.* illustrates in Figure 3 an electroplating system platform 200 having a loading station 210, a plurality of processing stations 218, one or more processing cells 240, a substrate orientor 230, a substrate holder assembly 450, a process kit 420, a bowl 430, a container body 472, an anode assembly 474, and a filter 476. The Examiner states that the container body 472 of *Cheung et al.* is preferably comprised of an electrically insulative material, such as ceramics, plastics, acrylic, lexane, PVC, CPVC, and PVDF.

Applicants have amended claim 15 to change the words "movably disposed" into "vertically and laterally movable", restating elements already present in the claims, and to include the words "to hold the substrate", making explicit what was inherent. Applicants respectfully traverse this rejection on grounds that the references cited by the Examiner do not teach, show, or suggest a processing system as recited in amended claim 15 and claims dependent therefrom.

Schwartz et al. is discussed above and does not teach, show, or suggest a shaft adapted to rotate the partial enclosure, and a substrate carrier vertically and laterally movable above the permeable disc. *Cheung et al.* discloses an electroplating system having multiple processing stations including a loading station, a spin-rinse-dry module, and multiple electroplating process cells. Each processing cell of *Cheung et al.* includes a rotating substrate holder assembly. However, each processing cell of *Cheung et al.* is not rotating. Therefore, *Cheung et al.* does not teach, show, or suggest a shaft adapted to rotate the partial enclosure. *Thus, Schwartz et al.* and *Cheung et al.*, individually or in combination, do not teach, show, or suggest a shaft adapted to rotate the partial enclosure as recited in amended claim 15 and claims dependent therefrom. . Claims 15-17, 22, 26, 28 and 29, as amended, are now in condition for allowance. Withdrawal of the rejection is respectfully requested.

Claims 15, 19, 22, 23 and 25 are rejected under 35 U.S.C. 103(a) as being obvious over *Pearson et al.* in view of *Cheung et al.* The Examiner states that *Pearson et al.* fails to teach multiple processing stations and *Cheung et al.* illustrates in Figure 3 and Figure 6 an electroplating system platform 200 and an electroplating process cell 400 and teaches an electrically insulative material for a container body 472.

Applicants have amended claim 15 as discussed above. Applicants respectfully traverse this rejection.

Pearson et al. is discussed above and does not teach, show, or suggest a shaft adapted to rotate the partial enclosure, a substrate carrier vertically and laterally movable above the permeable disc, and a diffuser plate positioned below the permeable disc.

Cheung et al. discloses an electroplating system as discussed above and does not teach, show, or suggest a shaft adapted to rotate the partial enclosure. In addition, *Cheung et al.* does not teach, show, or suggest a permeable disc positioned in the partial enclosure, Thus, *Pearson et al.* and *Cheung et al.*, individually or in combination, do not teach, show, or suggest a shaft adapted to rotate the partial enclosure, nor a diffuser plate positioned below the permeable disc as recited in amended claim 15 and claims dependent therefrom. Therefore, claims 15, 19, 22, 23 and 25, as amended, are now in condition for allowance. Withdrawal of the rejection is respectfully requested.

Claims 6, 11, 12, 20, 24 and 25 stand rejected under 35 U.S.C. 103(a) as being obvious over *Schwartz et al.* or *Pearson et al.* in view of *Talieh et al.* (US patent No. 6, 176, 992). The Examiner states that *Talieh et al.* teaches a mechanical pad assembly 12 disposed in a container 20, where the mechanical pad assembly 12 includes an anode plate 30 made of a porous or solid conductive material and a mechanical pad 32 made of a nonconductive porous material such as polyurethane and mounted onto the face of anode plate 30.

Applicants respectfully traverse this rejection. The teachings of *Schwartz et al.* and *Pearson et al.* have been discussed above, as applied to claim 1 and 15, and both fail to teach, show, or suggest the apparatus as recited in amended claims 1 and 15, and cannot be served to combine with reference as basis for rejection for claims 6, 11, 12, 20, 24 and 25, which are dependent from claim 1 and 15.

In addition, as the Examiner points out, *Schwartz et al.* and *Pearson et al.* both fail to disclose the material of construction of the permeable disk or anode, and *Schwartz et al.* and *Pearson et al.* both fail to teach that the anode contacts the permeable disk. Furthermore, the examiner has failed to point out that the references have shown or suggested to combine the teachings.

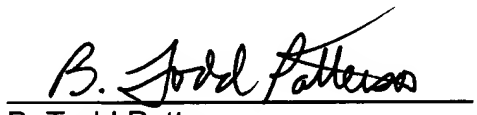
Furthermore, *Talieh et al.* does not teach, show, or suggest a diffuser plate as recited in claims 1 and 15 and there is no motivation shown or suggested to combine the teachings. Therefore, claims 6, 11, 12, 20, 24 and 25, dependent from claims 1 and 15, as amended now are in condition for allowance. Withdrawal of the rejection is respectfully requested.

Claims 18, 21 and 27 stand rejected under 35 U.S.C. 103(a) as being unpatentable over *Schwartz et al.* or *Pearson et al.* in view of *Uzoh et al.*, in further view of *Cheung et al.* The teachings of *Schwartz et al.*, *Pearson et al.*, *Uzoh et al.*, and *Cheung et al.* have been described above.

Applicants have amended claim 15 as discussed above. Applicants respectfully traverse this rejection on ground that none of the references cited by the Examiner teach, show, or suggest the processing system as recited in amended claim 15 and claims dependent therefrom. As discussed above, *Schwartz et al.*, *Pearson et al.*, *Uzoh et al.*, and *Cheung et al.*, individually or in combination, do not teach, show, or suggest a shaft adapted to rotate the partial enclosure. Therefore, claims 18, 21 and 27, dependent from claim 15, as amended, are now in condition for allowance. Withdrawal of the rejection is respectfully requested.

In conclusion, the references cited by the Examiner, neither alone nor in combination, teach, show, or suggest the claimed aspects of the invention. Having addressed all issues set out in the office action, applicants respectfully submit that the pending claims are in condition for allowance and respectfully request that the claims be allowed.

Respectfully submitted,



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Appendix

IN THE TITLE:

Please change the title from "Integrated Multi-Step Gap Fill and All Feature Planarization for Conductive Materials" to --Method and Apparatus for Electro-Chemical Processing--.

IN THE SPECIFICATION:

Please replace the paragraph from page 9, line 25, to page 10, line 10, with the following paragraph:

The diffuser plate 44 provides support for the permeable disc 28 in the partial enclosure 34. The diffuser plate 44 can be secured in the partial enclosure 34 using fasteners such as screws [38] 48 or other means such as snap or interference fit with the enclosure, being suspended therein and the like. The diffuser plate 44 can be made of a material such as a plastic, e.g., fluoropolymer, PE, TEFLON®, PFA, PES, HDPE, UHMW or the like. The diffuser plate 44, in at least one embodiment, includes a plurality of holes or channels 46 formed therein. The holes 46 are sized to enable fluid flow therethrough and to provide uniform distribution of electrolyte through the permeable disc 28 to the substrate 22. The permeable disc 28 can be fastened to the diffuser plate 44 using adhesives that are compatible with the fluid environment and the processing requirements. The diffuser plate 44 is preferably spaced from the anode 26 to provide a wider process window, thus reducing the sensitivity of plating film thickness to the anode dimensions, and to separate the accelerator and suppressor decomposition by-products, for example, a mono-sulfide compound degraded from an accelerator, such as bis(3-sulfopropyl) disulfide, $C_6H_{12}Na_2O_6S_4$, commercially available from the Raschig Corp. of Germany, from a main plating volume 38 as shown in Figure 2 [defined between the permeable disc 28 and the substrate 22].

Please replace the paragraph at page 13, lines 8-23, with the following paragraph:

Figures 5A, 5B, 5C and 5D depict the substrate 22 being loaded into the carrier assembly 30. In Fig. 5A, the gripper fingers 74 are rotated to form the seat 50 that receives the substrate 22 from the robot not shown. The head assembly 78 is disposed in a first position 502 proximate the seat assembly 76. The substrate clamps 322 are fully extended from the first side 314 of the support plate 306 [308]. After the robot is removed leaving the substrate 22 in the seat 50 of the gripper finger 74, the head assembly 78 is then extended into a second position 504 to load the substrate 22 held in the seat 50 between the substrate clamps 322 (See Figure 5B). The first clamps 402 center the substrate 22 relative to the head assembly 78. The clamps 322 are then retracted towards the support plate 306 [308]. The angled wall 422 of the second clamp 404 contacts the beveled edge of the substrate 22 and pulls the substrate 22 against the support plate 306 [308]. The interaction between the angled wall 422 and substrate 22 additionally causes the second clamp 404 to flex outwardly against the détente pin 416, displacing the bottom surface 420 of the notch 418 from the substrate perimeter. The flexed second clamp 404 and the détente pin 416 combine to urge the second clamp 404 inwardly to capture the substrate 22 against the support plate 306 [308] while providing good electrical contact between the clamp 404 and substrate 22 (See Figures 5C and 5D).

Please replace the paragraph at page 15, lines 13-22, with the following paragraphs:

The apparatus 800 discloses an enclosure 834 which typically includes a diffuser plate 844 and a permeable disc 828 disposed therein in a first relative position 810 adjacent to but vertically displaced from substrate 822 disposed in carrier assembly 830 described above in Figure 2. The permeable disc 828, such as a polishing pad, is disposed and supported in the electrolyte cell on the diffuser plate 844. The partial enclosure 834 [34] can be a bowl shaped member made of a plastic such as fluoropolymers, TEFLON®, PFA, PE, PES, or other materials that are compatible with plating chemistries. The enclosure 834 generally defines a container or electrolyte cell

in which an electrolyte or other polishing/deposition fluid can be confined. The electrolyte used in processing the substrate 22 can include metals such as copper, nickel or other materials which can be electroless deposited onto a substrate.

Please replace the two paragraphs at page 18, lines 8-22, with the following paragraphs:

Fig. 11 depicts a sectional view of the substrate carrier head assembly 1004 supported above the plating station 1002 [1006]. In one embodiment, the substrate carrier head assembly 1004 is substantially similar to the substrate carrier assembly 30 described above. Similarly, the plating station 1002 [1006] includes a partial enclosure 1102 that defines an electrolyte cell to facilitate metal deposition on the substrate 22 that is substantially similar to the enclosure 30 described above. The enclosure 1102 of the plating station 1002 [1006] is coupled to a motor that provides rotation of the enclosure 1102.

The arrangement of the plating stations 1002 [1006] and polishing stations 1006 [1002]. on the depositing and planarizing module 1012 allow for the substrate 22 to be sequentially plated or polishing by moving the substrate between stations. The substrate 22 may be processed in each station 1002, 1006 while remaining in it respective head or carrier 1038, 1004, or the substrate may be switched between heads by offloading the substrate from one head into the load cup and loading into the substrate into the other polishing head. Optionally, the depositing and planarizing module 1012 may comprise only one type of head may be utilized (i.e., all polishing heads 1038 or all carrier heads 1004).

IN THE CLAIMS:

Please amend claims 1,14-16, 19, and 26-27.

Please cancel claims 30-88 without prejudice.

Please add new claims 89-119.

1. (Amended) An apparatus for depositing and planarizing a material on a substrate, comprising:

a) a partial enclosure defining a processing region and having a fluid inlet and a fluid outlet;

b) a shaft connected to the partial enclosure on one end and to an actuator on an opposing end thereof and adapted to rotate the partial enclosure;

c) a permeable disc disposed in the partial enclosure;

d) a diffuser plate disposed in the partial enclosure and positioned below the permeable disc; and

e) a substrate carrier vertically and laterally movable [movably disposed] above the permeable disc, the substrate carrier having a substrate mounting surface to hold the substrate and a plurality of electrical contacts disposed about the perimeter of the substrate receiving surface.

14. (Amended) The apparatus of claim 1, wherein the apparatus provides orbital motion, circular rotation, translational motion, or linear motion between the substrate [wafer] and the permeable disk.

15. (Amended) A processing system for forming a planarized layer on a substrate, comprising:

a) a processing platform having two or more processing stations, a loading station and a substrate transfer device disposed above the processing stations and the loading station;

b) a processing apparatus positioned at each processing station, the processing apparatus comprising:

(i) a partial enclosure defining a processing region and having a fluid inlet and a fluid outlet;

(ii) a shaft connected to the partial enclosure on one end and to an actuator on an opposing end thereof and adapted to rotate the partial enclosure;

(iii) a permeable disc disposed in the partial enclosure;

(iv) a diffuser plate disposed in the partial enclosure and positioned below the permeable disc; and

(v) a substrate carrier vertically and laterally movable [movably disposed] above the permeable disc, the substrate carrier having a substrate mounting surface to hold the substrate and a plurality of electrical contacts disposed about the perimeter of the substrate receiving surface.

16. (Amended) The processing system of claim 15, wherein the processing apparatus further comprises [comprising] a second fluid inlet disposed above the permeable disc to deliver a fluid onto the permeable disc.

19. (Amended) The processing system of claim 15, wherein the processing apparatus further comprises [comprising] an anode disposed in the partial enclosure below the diffuser plate.

26. (Amended) The processing system of claim 15, wherein the processing apparatus provides orbital motion, circular rotation, translational motion, or linear motion between the wafer and the permeable disk.

27. (Amended) The processing system of claim 15, wherein the processing apparatus further comprises [comprising] a membrane disposed between the anode and permeable disk.